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10/540,019	06/22/2005	Hiroshi Iwata	0020-5383PUS1	8857
2292 7590 04/08/2008 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747				
EXAMINER				
PHAM, LONG				
ART UNIT		PAPER NUMBER		
2814				
NOTIFICATION DATE		DELIVERY MODE		
04/08/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

### Office Action Summary

**Application No.**

10/540,019

**Applicant(s)**

IWATA ET AL.

**Examiner**

Long Pham

**Art Unit**

2814

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) 7-8, 18-19, 21-22, 24-26, and 28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 9-17, 20, 23, 27 and 29-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 recites the limitation "gate conductor" in line 10. There is insufficient antecedent basis for this limitation in the claim.

Claim 2 recites the limitation "gate conductor" in line 11. There is insufficient antecedent basis for this limitation in the claim.

Claim 3 recites the limitation "gate conductor" in line 16. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 1, 6, 9, 10, 11, 13, 16, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Shukuri (US publication 2006/0008992).

With respect to claim 1, Shukuri teaches a semiconductor storage device comprising (see figs. 47-65 and associated text):

a semiconductor layer 121;

a **gate conductor 123** formed on the semiconductor layer, said **gate conductor consisting of a single gate electrode 123 on the semiconductor layer** with a gate insulation film 122 disposed therebetween;

a channel region arranged under the gate electrode;  
diffusion regions 128 arranged on opposite sides of the channel region; and  
memory function bodies 127 formed on opposite sides of the gate electrode and  
having a function to retain electric charges, **wherein said gate conductor inherently  
functions for writing to, and erasing and reading from the semiconductor device  
are solely carried out with the single gate electrode.**

With respect to claim 6, Shukuri further teaches each of the memory function  
bodies is comprised of one or more insulative materials 125 or 126, and at least part of  
each memory function body is formed so as to overlap with part of the corresponding  
diffusion region.

With respect to claim 9, Shukuri further teaches wherein each of the memory  
function bodies includes a charge retention film 127 having a function of storing electric  
charges, and an insulator 125 or 126.

With respect to claim 10, Shukuri further teaches wherein the charge retention  
film includes a first portion that has a surface roughly parallel to a surface of the gate  
insulation film.

With respect to claim 11, Shukuri further teaches wherein the charge retention  
film includes a second portion extended roughly parallel to a side surface of the gate  
electrode or the word line.

With respect to claim 12, Shukuri further teaches wherein the insulator includes  
an insulation film 125 or 126 that separates the gate electrode or the word line from the  
second portion of the charge retention film extended roughly parallel to the side surface  
of the gate electrode or the word line.

With respect to claim 13, Shukuri further teaches wherein the insulator includes  
an insulation film 125 or 126 that separates the first portion of the charge retention film  
from the channel region or the semiconductor layer.

With respect to claim 16, Shukuri further teaches wherein each diffusion region is  
effectively offset with respect to the gate electrode.

With respect to claim 29, Shukuri further teaches the gate electrode does not cover the memory function bodies.

Claims 2, 23, and 30 are rejected under 35 U.S.C. 102(e) as being anticipated by Shukuri (US publication 2006/0008992).

With respect to claim 1, Shukuri teaches a semiconductor storage device comprising (see figs. 47-65 and associated text):

a semiconductor layer 121;

a **gate conductor 123** formed on the semiconductor layer, said **gate conductor consisting of a single gate electrode 123 on the semiconductor layer** with a gate insulation film 122 disposed therebetween;

a channel region arranged under the gate electrode;

diffusion regions 128 arranged on opposite sides of the channel region; and

two charge storage regions 127, each of the charge storage regions being in a shape of a film parallel to a surface of the semiconductor layer and existing over part of the channel region and part of the corresponding diffusion region, straddling a boundary therebetween, **wherein said gate conductor inherently functions for writing to, and erasing and reading from the semiconductor device are solely carried out with the single gate electrode.**

With respect to claim 23, Shukuri further teaches wherein each diffusion region is effectively offset with respect to the gate electrode.

With respect to claim 30, Shukuri further teaches the gate electrode does not cover the charge storage regions.

Claim 3, 4, 5, 17, 27, and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by Shukuri (US publication 2006/0008992).

With respect to claim 1, Shukuri teaches a semiconductor storage device comprising (see figs. 47-65 (particularly 47, 48, and 60) and associated text):

a plurality of memory elements arranged along a word line 123, wherein two memory function bodies 127 having a function to retain electric charges are formed so as to extend along the word line on opposite sides of the word line, each of the plurality of memory elements comprising:

a semiconductor layer 121;

**a gate conductor 123 formed on the semiconductor layer, said gate conductor consisting of a single gate electrode 123 and comprising a part of the word line 123;**

a gate insulation film 122 formed between the semiconductor layer and the part of the word line;

a channel region arranged under the part of the word line;

diffusion regions 128 arranged on opposite sides of the channel region; and part of each of the memory function bodies that exists over part of the channel region and a part of the corresponding diffusion region, straddling a boundary therebetween, **wherein said gate conductor inherently functions for writing to, and erasing and reading from the semiconductor device are solely carried out with the single gate electrode.**

With respect to claim 4, Shukuri further teaches the word line consists of a single word line, the memory function bodies are arranged only on both sides of the single word line, and the memory function bodies are each comprised of one or more insulative materials 125 or 126.

With respect to claim 5, Shukuri further teaches a word line 123 to be selected when information is rewritten to the memory element is only the single word line. See fig. 49 and associated text.

With respect to claim 17, Shukuri further teaches wherein each diffusion region is effectively offset with respect to the word line.

With respect to claim 27, Shukuri further teaches wherein each of the memory function bodies includes a charge retention film 127 having a function of storing electric charges, and an insulator 125 or 126.

With respect to claim 31, Shukuri further teaches the word line does not cover the memory function bodies.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 14, 15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shukuri (US publication 2006/0008992).

With respect to claim 20, the use of flash memory device as flash drive or portable electronic equipment is well-known in semiconductor device.

With respect to claim 14, Shukuri further teaches the insulation film 125 or 126 that separates the first portion of the charge retention film from the channel region or the semiconductor layer has a film thickness but fails to teach the thickness of the insulation film which is smaller than a film thickness of the gate insulation film and not smaller than 0.8 nm.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value or range for the thickness of the insulation film through routine experimentation and optimization to obtain optimal or desired device performance because the thickness of the insulation film is a result-effective variable and there is no evidence indicating that the thickness of the insulation film is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

With respect to claim 15, Shukuri further teaches the insulation film 125 or 126 that separates the first portion of the charge retention film from the channel region or the semiconductor layer has a film thickness but fails to teach the thickness of the insulation film which is smaller than a film thickness of the gate insulation film and not smaller than 20 nm.

However, it would have been obvious to one of ordinary skill in the art of making semiconductor devices to determine the workable or optimal value or range for the thickness of the insulation film through routine experimentation and optimization to obtain optimal or desired device performance because the thickness of the insulation film is a result-effective variable and there is no evidence indicating that the thickness of the insulation film is critical or produces any unexpected results and it has been held that it is not inventive to discover the optimum or workable ranges of a result-effective variable within given prior art conditions by routine experimentation. See MPEP 2144.05.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-6, 9-17, 20, 23, 27, and 29-31 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



Art Unit: 2814

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long Pham whose telephone number is 571-272-1714. The examiner can normally be reached on Mon-Frid, 10am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 571-272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Long Pham/  
Primary Examiner, Art Unit 2814

/L. P./  
Primary Examiner, Art Unit 2814